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B. Professional Education: EDU 150, 250, 326, 418, 433; PSY 213, 318; SE 225.
C. Completion of applicable portions of the Praxis II.
D. For additional information, see the Assistant Dean for Teacher Education and Accreditation.

A. CHE 111, 112, 211, 221, 314, 315, 324 326—23 hours
B. Elective, one of: 317, 319, 335, 405, 430—3 or 4 hours

The Department utilizes standardized tests of the American Chemical Society as final examinations for the second semester of all one-year courses. These courses include General (CHE 111-2), Organic (CHE 314-5 and CHE 435), and Physical (CHE 317-8). Standardized examinations are also used as the final examination in Fundamentals (CHE 105), Analytical (CHE 211), and Biochemistry (CHE 319), Inorganic (CHE 335 and CHE 430). Examination results are used to monitor progress of students as a group through their course of study at Union. Strengths and weaknesses of courses are also assessed by comparing class averages with national norms. Students are required to complete a research project (CHE 424) and give a seminar to faculty and colleagues (CHE 498).

is organized to better acquaint students interested in chemical science with professional opportunities in the field and the mechanics of preparing and presenting technical material. The organization instills professional pride in the chemical sciences, while stimulating awareness of the responsibilities and challenges of the modern chemist. Membership is open to any student pursuing an undergraduate degree in chemistry or physics.

is a national honorary science society for those who have completed 15 hours in natural science and mathematics and with a minimum 3.0 GPA in these courses. Membership advantages include recognition for academic achievements by the Sigma Zeta Honor Award, participation in nationally recognized research projects, and a means of cooperation in similar areas of interest by students of different colleges.

is given by the faculty of the Department of Chemistry and Physics to the student who presents the best research paper of the year. The research must have been an original piece of work and must have been presented at a state, regional, or national professional chemistry meeting prior to graduation.

given to encourage and sustain interest in the sciences, is awarded in recognition of outstanding scholastic achievement in Freshman Chemistry.

The Chemistry Department selects a freshman chemistry major or minor to receive this award based on outstanding scholastic achievement, financial need, Christian service, and school spirit.

( ) Hours Credit; F–Fall, W–Winter; S–Spring; Su–Summer

An introductory general chemistry course that includes study of both physical and chemical properties, structure and reaction of matter. Not applicable to pre-health professions except Nursing. Science credit will not be given to a student who has completed a course in either CHE or PHY. Three lectures and one 2-hour laboratory period/week.

Prerequisite: CHE 105 or 111.
A beginning course in organic and biochemistry with emphasis on topics specifically related to the health sciences: carbohydrates, fats, proteins, vitamins, and hormones. Normal and abnormal metabolic processes and the role of ATP. Not open to science majors other than physical science and nursing. Three 1-hour lectures and one 3-hour laboratory period/week.

Prerequisite: high school chemistry or PHY 111. A strong mathematics background (especially in algebra) is recommended.
A comprehensive study of the fundamental experiments, principles, and theories of chemistry with emphasis on the quantitative relationships. The structure and properties of matter with their energy relationships are stressed. Three lectures and one 3-hour laboratory/week.

Prerequisite: CHE 111.
Detailed study of the principles of equilibrium in chemical systems. The laboratory is qualitative analysis. Three lectures and one 3-hour laboratory period/week.

Prerequisite: CHE 111
An introduction to chemical instrumentation used in industry, including titrations, spectroscopy, and chromatography. One lecture and one 3-hour lab/week.

Prerequisite: CHE 112; Corequisite: CHE 221.
A continuation of the study of fundamental principles including topics in statistics, gravimetric analysis, titrimetric analysis (neutralization, precipitation, complex formation, oxidation-reduction), and spectrophotometric analysis.

Prerequisite: CHE 112; Corequisite: CHE 211.
The application of gravimetric, titrimetric, and spectrophotometric quantitative analysis to the study of chemistry. Two 3-hour laboratory periods/week.

Safety policies and procedures for the use of hazardous chemicals. Topics include awareness, routes of chemicals into the body, safety apparatus and use; identification, types of chemical hazards; proper ways to handle, store, and dispose of hazardous chemicals.

Reciprocal credit: PHY 301. See PHY 301 for course description.

Prerequisite: CHE 112; Corequisite: CHE 324.
An introduction to the compounds of carbon, with emphasis on the relationship between structure and properties. Applications of bonding theory, reaction mechanism, and stereochemistry are included. Some functional groups containing halogen and oxygen will be examined in detail.

Prerequisite: CHE 314; Corequisite: CHE 326.
An in-depth examination of the common oxygen and nitrogen functional groups with respect to structure and chemistry. Continued application of basic theory is included. Heterocyclic and biomolecules will also be examined. Three lectures/week.

Prerequisites: CHE 211, MAT 212, and PHY 232.
Application of physical techniques to chemical systems with emphasis on thermodynamics. The laws of thermodynamics will be derived and applied to phase and chemical equilibria, electrochemical cells, and surface phenomena.

Prerequisite: CHE 317.
A continuation of CHE 317 with emphasis on dynamics and quantum chemistry: kinetics, mechanisms, and photochemistry; atomic and molecular electronic structure and application to spectroscopy.

Prerequisite: CHE 315, CHE 326, and BIO 112.
Introduction to the organic chemistry of living systems. Topics include the structure and function of proteins, enzymic control of chemical reactions, catabolism, anabolism, bioenergetics, biosynthesis, and molecular biology. Three lectures and one 3-hour lab/week.

A continuation of 319 with emphasis on bioenergetics and metabolism. Topics include the function and molecular control of catabolic pathways for proteins, lipids, and carbohydrates as well as anabolic pathways for biological synthesis of these molecules.

Corequisite: CHE 314.
Introduction to the basic techniques for the physical characterization and isolation of organic compounds. Use of spectrometric methods as applied to the determination of structure is included, as are some synthetic methods. Two 3-hour labs/week.

Prerequisite: CHE 314 and CHE 324;
Corequisite: CHE 315.
Application of laboratory techniques in synthesis and characterization of organic and inorganic compounds. Two 3-hour laboratory periods/week.

Corequisite: CHE 318.
The application of physical methods in the study of chemical compounds. Two 3-hour labs/week.

Pre– or Corequisite: CHE 315.
Introduction to inorganic compounds with an emphasis on coordination, bioinorganic, nuclear, and organometallic chemistry. The relationships between structure, physical properties, and reactivity will be examined in detail.

Prerequisite: CHE 315.
Study of rapid changes in earth's atmosphere, water, and soil caused by the activities of humankind with attention to the ozone layer, air quality, and water cycles. The vectors, fate, and treatment/removal strategies for organic and heavy metal pollutants will be discussed. Three lectures and one 3-hour lab/week.

Prerequisite: 20 hours of chemistry and junior/senior standing.
The student's knowledge is integrated by application of a simple piece of original work. Each course will be three hours per week per credit hour.

Prerequisite: CHE 211. Pre-or Corequisite: CHE 318 & 335.
A theoretical treatment of fundamental inorganic topics such as chemical bonding, periodic relationships, stereochemistry of inorganic complexes, acids and bases, and physical properties of inorganic compounds. Three lectures and one 3 hour lab/week.

Prerequisite: CHE 315.
Extensive treatment of topics including reaction mechanisms, stereochemistry, heterocyclic chemistry, and molecular rearrangements. Three lectures and one 3-hour lab/week.

Prerequisite: 20 hours of chemistry and junior/senior standing.
Skills in scientific and technical presentations, written and oral, will be polished. To be used at the discretion of the department for majors and minors only.

Chemical analysis of various body fluids and the study of their relationship to disease states.

The principles, use, and care of instruments found in up-to-date laboratories.

Application of theory to technical performance in hematological procedures which aid in classification of anemias, leukemias, and other blood cell abnormalities.

A lecture and lab course covering the role of microorganisms as they cause disease in man. Methods employed in the identification of bacteria, fungi, viruses, and rickettsiae.

A lecture and lab course in immunology, demonstrating reactions between antigens and antibodies are considered. Use of these reactions as a serodiagnostic tool is presented.

Includes selection, testing and bleeding of donors, identification of blood group antigens and antibodies, procedures employed in providing compatible blood for patients, and principles and procedures used in blood component therapy.

A study of parasites of medical significance, both indigenous